Robotics Links to ACARA

SCIENCE

FOUNDATION

Strand	Content Descriptions	Elaborations	LEGO Education	Teacher notes
Science Understanding	**Physical sciences** The way objects move depends on a variety of factors, including their size and shape. (ACSSU005)	Observing the way different shaped objects such as balls, blocks and tubes move.	**Identify and describe shapes in playground and how people move on play equipment. Observe built WeDo playground equipment and use shapes to draw and create own playground equipment (see maths activity).**	Build WeDo Playground equipment. http://tinyurl.com/bfbdduw Build WeDo Ferris Wheel. http://tinyurl.com/ae55kcr Build Early Simple Machines Seesaw. (see 9656 Activity Pack) Identify and use knowledge and understandings of two-dimensional shapes to discuss how shapes can be used to create or enhance playground designs. Share observations about movement of playground equipment.
Science as a Human Endeavour	**Nature and development of science** Science involves exploring and observing the world using the senses. (ACSHE013)	Sharing observations with others and communicating their experiences.	**Identify and describe shapes in playground and how people move on play equipment. Observe built WeDo playground equipment and use shapes to draw and create own playground equipment (see maths activity).**	Build WeDo Playground equipment. http://tinyurl.com/bfbdduw Build WeDo Ferris Wheel. http://tinyurl.com/ae55kcr Build Early Simple Machines Seesaw. (see 9656 Activity Pack) Identify and use knowledge and understandings of two-dimensional shapes to discuss how shapes can be used to create or enhance playground designs. Share observations about movement of playground equipment.

Dr Christina Chalmers
School of Curriculum
Faculty of Education,
Queensland University of Technology

Chris Bracken
Science, Maths and Computing Teacher,
Guilford Young College, Hobart, Tasmania

Robotics Links to ACARA

SCIENCE INQUIRY SKILLS FOUNDATION

Questioning and predicting	Planning and conducting	Processing and analysing data & information	Communicating
Respond to questions about familiar objects and events. (ACSIS014)	Respond to questions about familiar objects and events. (ACSIS014)	Engage in discussions about observations and use methods such as drawing to represent ideas. (ACSIS233)	Share observations and ideas. (ACSIS012)

Dr Christina Chalmers
School of Curriculum
Faculty of Education,
Queensland University of Technology

Chris Bracken
Science, Maths and Computing Teacher,
Guilford Young College, Hobart, Tasmania

Robotics Links to ACARA

SCIENCE GRADE 1

Strand	Content Descriptions	Elaborations	LEGO Education	Teacher notes
Science Understanding	**Physical sciences** Living things have a variety of external features. (ACSSU017)	Recognising common features of animals such as head, legs and wings.	**Follow building instructions to build WeDo wild animals, dancing birds, roaring lion, and hungry croc.**	WeDo Software v1.2 & Activity Pack (building instructions).
		Describing the use of animal body parts for particular purposes such as moving and feeding.		
	Physical sciences Light and sound are produced by a range of sources and can be sensed. (ACSSU020)	Comparing sounds made by musical instruments using characteristics such as loudness, pitch and actions used to make the sound.	**Design and make music boxes in groups.**	WeDo Building and programming instructions. http://tinyurl.com/8595ofv Discuss and compare different sounds.
Science as a Human Endeavour	**Use & influence of science** People use science in their daily lives, including when caring for their environment and living things. (ACSHE022)	Exploring how musical instruments can be used to produce different sounds.	**Design and make music boxes in groups.**	WeDo Building and programming instructions. http://tinyurl.com/8595ofv Discuss and compare different sounds.
		Identifying ways that science knowledge is used in the care of the local environment such as animal habitats, and suggesting changes to parks and gardens to better meet the needs of native animals.	**Create animal habitats for WeDo animals.**	Discuss animal needs for designed habitats.

Dr Christina Chalmers
School of Curriculum
Faculty of Education,
Queensland University of Technology

Chris Bracken
Science, Maths and Computing Teacher,
Guilford Young College, Hobart, Tasmania

Robotics Links to ACARA

SCIENCE INQUIRY SKILLS GRADE 1

Questioning and predicting	Planning and conducting	Processing and analysing data & information	Evaluating	Communicating
Respond to and pose questions, and make predictions about familiar objects and events. (ACSIS024)	Participate in different types of guided investigations to explore and answer questions, such as manipulating materials, testing ideas, and accessing information sources. (ACSIS025)	Use a range of methods to sort information, including drawings and provided tables. (ACSIS027)	Compare observations with those of others. (ACSIS213)	Represent and communicate observations and ideas in a variety of ways such as oral and written language, drawing and role play. (ACSIS029)
	Use informal measurements in the collection and recording of observations, with the assistance of digital technologies as appropriate. (ACSIS026)	Through discussion, compare observations with predictions. (ACSIS212)		

Dr Christina Chalmers
School of Curriculum
Faculty of Education,
Queensland University of Technology

Chris Bracken
Science, Maths and Computing Teacher,
Guilford Young College, Hobart, Tasmania

Robotics Links to ACARA

SCIENCE GRADE 2

Strand	Content Descriptions	Elaborations	LEGO Education	Teacher notes
Science Understanding	**Physical sciences** A push or a pull affects how an object moves or changes shape. (ACSSU033)	Exploring ways that objects move on land.	**Follow instructions to build and program a LEGO car to travel on a flat surface.**	Test cars of different sizes, weight, and length and compare predicted outcomes to results. Building and Programming instructions http://tinyurl.com/73sryvx (NXT)
		Exploring how different strengths of pushes and pulls affect the movement of objects.	**Build a Car Launcher (See Early Simple Machines Activity Pack).**	Early Simple Machines Activity Pack 9656 Simple & Powered Machines Set http://tinyurl.com/c3jk76w
Science as a Human Endeavour	**Nature & development of Science** Science involves asking questions about, and describing changes in, objects and events. (ACSHE034)	Describing everyday events and experiences and changes in our environment using knowledge of science.	**Use NXT robot car to push can around flat surface. Modify existing program to investigate how different power levels affect the movement of the robot.**	Describe how changes to the car affects movement. Building and Programming instructions http://tinyurl.com/73sryvx (NXT)
		Suggesting how everyday items work, using knowledge of forces or materials.	**Use ramp to investigate how LEGO cars travel with and without a push or pull.**	Early Simple Machines Activity Pack 9656 Simple & Powered Machines Set http://tinyurl.com/c3jk76w

Dr Christina Chalmers
School of Curriculum
Faculty of Education,
Queensland University of Technology

Chris Bracken
Science, Maths and Computing Teacher,
Guilford Young College, Hobart, Tasmania

Robotics Links to ACARA

SCIENCE INQUIRY SKILLS GRADE 2

Questioning and predicting	Planning and conducting	Processing and analysing data & information	Evaluating	Communicating
Respond to and pose questions, and make predictions about familiar objects and events. (ACSIS024)	Participate in different types of guided investigations to explore and answer questions, such as manipulating materials, testing ideas, and accessing information sources. (ACSIS025)	Use a range of methods to sort information, including drawings and provided tables. (ACSIS027)	Compare observations with those of others. (ACSIS213)	Represent and communicate observations and ideas in a variety of ways such as oral and written language, drawing and role play. (ACSIS029)
	Use informal measurements in the collection and recording of observations, with the assistance of digital technologies as appropriate. (ACSIS026)	Through discussion, compare observations with predictions. (ACSIS212)		

Dr Christina Chalmers
School of Curriculum
Faculty of Education,
Queensland University of Technology

Chris Bracken
Science, Maths and Computing Teacher,
Guilford Young College, Hobart, Tasmania

Robotics Links to ACARA

SCIENCE GRADE 3

Strand	Content Descriptions	Elaborations	LEGO Education	Teacher notes
Science Understanding	**Biological sciences** Living things can be grouped on the basis of observable features and can be distinguished from nonliving things. (ACSSU044)	Sorting living and nonliving things based on characteristics.	**Follow building instructions to build WeDo wild animals, dancing birds, roaring lion, and hungry croc.**	WeDo Software v1.2 & Activity Pack (building instructions) Describe common features of WeDo animals.
			Design, build and program a robot that meets a design brief. E.g. Follow NXT kit instructions to build a robot. Label robot design and program. Identifying major features of the system.	Identify similarities and differences between robots and humans.
	Physical sciences Heat can be produced in many ways and can move from one object to another. (ACSSU049)	Describing how heat can be produced such as through friction or motion.	**Build basic robot car** **Test the robot on different surfaces. Predict and compare the movement of the robot on the different surfaces.**	http://tinyurl.com/bapfyzd (NXT) http://tinyurl.com/6p33mpd (WeDo) Use understanding of materials to describe how robot moves on different surfaces. Discus what changes can be made to the investigation to maintain a 'fair' test.
			Make water bottle insulator to maintain temperature of water. Measure temperature changes using NXT sensor.	Compare different materials for heat transference properties e.g. aluminium foil, cardboard, fabric. Write report of investigation including diagrams.

Dr Christina Chalmers
School of Curriculum
Faculty of Education,
Queensland University of Technology

Chris Bracken
Science, Maths and Computing Teacher,
Guilford Young College, Hobart, Tasmania

Robotics Links to ACARA

SCIENCE GRADE 3

Strand	Content Descriptions	Elaborations	LEGO Education	Teacher notes
Science as a Human Endeavour	**Use & influence of science** Science knowledge helps people to understand the effect of their actions. (ACSHE051)	Investigating how science helps people such as nurses, doctors, dentists, mechanics and gardeners.	**Investigate the use of robotics in Medicine.**	Useful link: http://tinyurl.com/3v3pk94

SCIENCE INQUIRY SKILLS GRADE 3

Questioning and predicting	Planning and conducting	Processing and analysing data & information	Evaluating	Communicating
With guidance, identify questions in familiar contexts that can be investigated scientifically and predict what might happen based on prior knowledge. (ACSIS053)	Suggest ways to plan and conduct investigations to find answers to questions. (ACSIS054)	Use a range of methods including tables and simple column graphs to represent data and to identify patterns and trends. (ACSIS057)	Reflect on the investigation, including whether a test was fair or not.(ACSIS058)	Represent and communicate ideas and findings in a variety of ways such as diagrams, physical representations and simple reports. (ACSIS060)
	Safely use appropriate materials, tools or equipment to make and record observations, using formal measurements and digital technologies as appropriate. (ACSIS055)	Compare results with predictions, suggesting possible reasons for findings. (ACSIS215)		

Dr Christina Chalmers
School of Curriculum
Faculty of Education,
Queensland University of Technology

Chris Bracken
Science, Maths and Computing Teacher,
Guilford Young College, Hobart, Tasmania

Robotics Links to ACARA

SCIENCE

GRADE 4

Strand	Content Descriptions	Elaborations	LEGO Education	Teacher notes
Science Understanding	**Physical sciences** Forces can be exerted by one object on another through direct contact or from a distance. (ACSSU076)	Comparing and contrasting the effect of friction on different surfaces, such as tyres and shoes on a range of surfaces.	**Build and program a LEGO car and predict, test, and compare the friction of different surfaces.**	http://tinyurl.com/35c7ugg (NXT) Discuss how wheels and gears can control movement. Present results and explain how changes to variables maintained a 'fair' test.
Science as a Human Endeavour	**Use & influence of science** Science knowledge helps people to understand the effect of their actions. (ACSHE062)	Investigating how a range of people, such as clothing designers, builders or engineers use science to select appropriate materials for their work.	**Investigate the use of robotics in Engineering.**	Useful link: http://www.legoengineering.com Write report, including diagrams, on the use of robotics in Engineering and the types of materials used.
			Design a robot that meets a design brief.	Label robot design identifying materials used. Discuss the use of materials and compare robots.

Dr Christina Chalmers
School of Curriculum
Faculty of Education,
Queensland University of Technology

Chris Bracken
Science, Maths and Computing Teacher,
Guilford Young College, Hobart, Tasmania

Robotics Links to ACARA

SCIENCE INQUIRY SKILLS GRADE 4

Questioning and predicting	Planning and conducting	Processing and analysing data & information	Evaluating	Communicating
With guidance, identify questions in familiar contexts that can be investigated scientifically and predict what might happen based on prior knowledge. (ACSIS064)	Suggest ways to plan and conduct investigations to find answers to questions. (ACSIS065)	Use a range of methods including tables and simple column graphs to represent data and to identify patterns and trends. (ACSIS068)	Reflect on the investigation; including whether a test was fair or not. (ACSIS069)	Represent and communicate ideas and findings in a variety of ways such as diagrams, physical representations and simple reports. (ACSIS071)
	Safely use appropriate materials, tools or equipment to make and record observations, using formal measurements and digital technologies as appropriate. (ACSIS066)	Compare results with predictions, suggesting possible reasons for findings. (ACSIS216)		

Dr Christina Chalmers
School of Curriculum
Faculty of Education,
Queensland University of Technology

Chris Bracken
Science, Maths and Computing Teacher,
Guilford Young College, Hobart, Tasmania

Robotics Links to ACARA

SCIENCE GRADE 5

Strand	Content Descriptions	Elaborations	LEGO Education	Teacher notes
Science Understanding	**Physical sciences** Light from a source forms shadows and can be absorbed, reflected and refracted. (ACSSU080)	Comparing shadows from point and extended light sources.	**Use NXT as a data logger and pre-program to measure brightness of light in the classroom using light sensor.**	http://tinyurl.com/cgjgkdh (NXT) Make changes to variables and measure and record data from trials. Present results of investigation.
Science as a Human Endeavour	**Nature & development of Science** Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena. (ACSHE081)	Developing an understanding of the behaviour of light by making observations of its effects. Researching how scientists were able to develop ideas about the solar system through the gathering of evidence through space exploration.	**Research the use of robotics in Space exploration.**	Useful links: http://marsrovers.jpl.nasa.gov/home/index.html http://tinyurl.com/88l6kud Investigate the role of scientists in space exploration.
	Nature and development of science Important contributions to the advancement of science have been made by people from a range of cultures. (ACSHE082)	Researching the different types of scientists who work in teams in space exploration, and Australia's involvement in space exploration.		
	Use and influence of science Scientific understandings, discoveries and inventions are used to solve problems that directly affect peoples' lives. (ACSHE083)	Describing how technologies developed to aid space exploration have changed the way people live, work and communicate.	**Design a new 'Mars Rover" using sensors (light, ultrasonic, touch) to avoid obstacles. Program Rover to move across a floor map of Mars.**	Example line follower program. (light sensor) http://tinyurl.com/3vftzp Discuss how space exploration has affected human life on earth.

Dr Christina Chalmers
School of Curriculum
Faculty of Education,
Queensland University of Technology

Chris Bracken
Science, Maths and Computing Teacher,
Guilford Young College, Hobart, Tasmania

Robotics Links to ACARA

SCIENCE INQUIRY SKILLS GRADE 5

Questioning and predicting	Planning and conducting	Processing and analysing data & information	Evaluating	Communicating
With guidance, pose questions to clarify practical problems or inform a scientific investigation, and predict what the findings of an investigation might be. (ACSIS231)	With guidance, plan appropriate investigation methods to answer questions or solve problems. (ACSIS086)	Construct and use a range of representations, including tables and graphs, to represent and describe observations, patterns or relationships in data using digital technologies as appropriate. (ACSIS090)	Suggest improvements to the methods used to investigate a question or solve a problem. (ACSIS091)	Communicate ideas, explanations and processes in a variety of ways, including multi-modal texts. (ACSIS093)
	Decide which variable should be changed and measured in fair tests and accurately observe, measure and record data, using digital technologies as appropriate. (ACSIS087)			
	Use equipment and materials safely, identifying potential risks. (ACSIS088)	Compare data with predictions and use as evidence in developing explanations. (ACSIS218)		

Dr Christina Chalmers
School of Curriculum
Faculty of Education,
Queensland University of Technology

Chris Bracken
Science, Maths and Computing Teacher,
Guilford Young College, Hobart, Tasmania

Robotics Links to ACARA

SCIENCE

GRADE 6

Strand	Content Descriptions	Elaborations	LEGO Education	Teacher notes
Science Understanding	**Physical sciences** Electrical circuits provide a means of transferring and transforming electricity. (ACSSU097)	Recognising the need for a complete circuit to allow the flow of electricity.	**Design and build an energy efficient house using NXT and Renewable Energy Add-On Set e.g. Lights turn on when car approaches garage.**	Write a report on the energy efficient house and suggest possible improvements.
		Investigating different electrical conductors and insulators.		
		Exploring the features of electrical devices such as switches and light globes.		
	Physical sciences Energy from a variety of sources can be used to generate electricity. (ACSSU219)	Investigating how moving air and water can turn turbines to generate electricity.	**Investigate energy production from wind turbine and solar panels. Collect data to determine amount of energy produced. Investigate cost and efficiency of solar panels.**	Research alternative energy sources for a sustainable future.
		Investigating the use of solar panels.		
		Considering whether an energy source is sustainable.		

Dr Christina Chalmers
School of Curriculum
Faculty of Education,
Queensland University of Technology

Chris Bracken
Science, Maths and Computing Teacher,
Guilford Young College, Hobart, Tasmania

Robotics Links to ACARA

SCIENCE GRADE 6

Strand	Content Descriptions	Elaborations	LEGO Education	Teacher notes
Science as a Human Endeavour	**Nature and development of science** Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena. (ACSHE098)	Investigating the use of electricity, including predicting the effects of changes to electric circuits.	**Investigate energy production from hand generator.**	http://tinyurl.com/d9tp4d2
	Use and influence of science Scientific understandings, discoveries and inventions are used to solve problems that directly affect peoples' lives. (ACSHE100)	Investigating how electrical energy is generated in Australia and around the world.	**Green City Challenge. (NXT)**	http://tinyurl.com/cp3c69e http://tinyurl.com/c8hsbbq
	Use and influence of science Scientific knowledge is used to inform personal and community decisions. (ACSHE220)	Considering how personal and community choices influence our use of sustainable sources of energy.		
		Discussing the use of electricity and the conservation of sources of energy.		

Dr Christina Chalmers
School of Curriculum
Faculty of Education,
Queensland University of Technology

Chris Bracken
Science, Maths and Computing Teacher,
Guilford Young College, Hobart, Tasmania

Robotics Links to ACARA

SCIENCE INQUIRY SKILLS GRADE 6

Questioning and predicting	Planning and conducting	Processing and analysing data & information	Evaluating	Communicating
With guidance, pose questions to clarify practical problems or inform a scientific investigation, and predict what the findings of an investigation might be. (ACSIS232)	With guidance, plan appropriate investigation methods to answer questions or solve problems. (ACSIS103)	Construct and use a range of representations, including tables and graphs, to represent and describe observations, patterns or relationships in data using digital technologies as appropriate. (ACSIS107)	Suggest improvements to the methods used to investigate a question or solve a problem. (ACSIS108)	Communicate ideas, explanations and processes in a variety of ways, including multi-modal texts. (ACSIS110)
	Decide which variable should be changed and measured in fair tests and accurately observe, measure and record data, using digital technologies as appropriate. (ACSIS104)			
	Use equipment and materials safely, identifying potential risks. (ACSIS105)	Compare data with predictions and use as evidence in developing explanations. (ACSIS221)		

Dr Christina Chalmers
School of Curriculum
Faculty of Education,
Queensland University of Technology

Chris Bracken
Science, Maths and Computing Teacher,
Guilford Young College, Hobart, Tasmania